

Introduction.....	i
Foreword to the Third Edition.....	ii
Foreword to the Second Edition	iv
Foreword to the First Edition.....	v
Acronyms, Abbreviations, and Conversion Charts.....	viii
Glossary	G-1

CHAPTER 1
HISTORY OF THE DEVELOPMENT OF AIR CLEANING TECHNOLOGY IN THE NUCLEAR INDUSTRY.....**1-1**

1.1 Brief History of Nuclear Aerosol Filtration.....	1-1
1.2 Deep-Bed Sand and Glass Fiber Filters	1-9
1.3 Brief History of Gas Adsorption.....	1-10
1.4 References.....	1-16

CHAPTER 2
SYSTEM CONSIDERATIONS**2-1**

2.1 Introduction.....	2-1
2.2 Environmental Considerations	2-1
2.3 Operational Considerations.....	2-14
2.4 Emergency Considerations	2-24
2.5 Multistage Filtration	2-29
2.6 Passive Safe Shutdown of Systems.....	2-31
2.7 Air Cleaning System Design Considerations for Commercial Nuclear Power Plants	2-34
2.8 References.....	2-49

CHAPTER 3
FILTERS FOR THE NUCLEAR INDUSTRY**3-1**

3.1 Introduction.....	3-1
3.2 Filtration.....	3-2
3.3 HEPA Filters.....	3-4
3.4 Prefilters for HEPA Filters.....	3-27
3.5 Deep-Bed Filters.....	3-32
3.6 Demisters	3-35
3.7 Filter Design Selection.....	3-36
3.8 References.....	3-38

CHAPTER 4
HOUSING DESIGN AND LAYOUT**4-1**

4.1 Introduction.....	4-1
4.2 Housing System Design	4-1
4.3 Component Installation.....	4-3
4.4 Man Entry Housing	4-7
4.5 Side-Access Housings.....	4-32
4.6 References.....	4-40

CHAPTER 5	
EXTERNAL COMPONENTS.....	5-1
5.1 Introduction.....	5-1
5.2 Ductwork	5-1
5.3 Dampers and Louvers	5-12
5.4 Fans and Motors.....	5-20
5.5 Air Intakes and Stacks	5-29
5.6 Instrumentation and Control	5-31
5.7 Other Considerations.....	5-34
5.8 References.....	5-35
CHAPTER 6	
SMALL AIR CLEANING UNITS	6-1
6.1 Introduction.....	6-1
6.2 Housings	6-3
6.3 Enclosed Filter Installation.....	6-9
6.4 Cylindrical Filter Elements	6-9
6.5 Installation	6-11
6.6 References.....	6-20
CHAPTER 7	
GLOVEBOX FILTRATION.....	7-1
7.1 Introduction.....	7-1
7.2 Design of Glovebox Ventilation Systems	7-5
7.3 Glovebox Filter Installations.....	7-15
7.4 Filter Replacement.....	7-22
7.5 Glovebox Safety.....	7-26
7.6 References.....	7-35
CHAPTER 8	
TESTING.....	8-1
8.1 Introduction.....	8-1
8.2 Proof of Design – HEPA Filter Design Qualification testing for Nuclear Service	8-3
8.3 Manufacturer's Quality Control – Inspection and Testing of HEPA Filters	8-6
8.4 Filter Test Facility Acceptance Testing of HEPA Filters.....	8-7
8.5 In-Place Component tests and Criteria	8-8
8.6 Surveillance Testing.....	8-14
8.7 In-Place Testing for Multistage Systems	8-23
8.8 Testing of Deep Bed Sand Filters.....	8-29
8.9 Areas for Continuous Improvement.....	8-30
8.10 Review of In-Place Filter Testing at Selected DOE Sites	8-31
8.11 Testing Portable HEPA Filtration Systems	8-31
8.12 Testing HEPA Filter Vacuum Cleaners	8-33
8.13 References.....	8-37
CHAPTER 9	
SPECIAL APPLICATION REQUIREMENTS	9-1
9.1 Introduction.....	9-1
9.2 Natural Phenomena	9-1
9.3 Deep-Bed Sand Filters.....	9-13
9.4 References.....	9-21

CHAPTER 10	
FIRE PROTECTION	10-1
10.1 Introduction.....	10-1
10.2 Fire History.....	10-2
10.3 Requirements and Guidelines.....	10-8
10.4 Enclosure Fire Modeling in Fire Hazards Analysis.....	10-9
10.5 Fire Phenomena.....	10-10
10.6 Fire Hazard Controls and Design Features	10-19
10.7 Operations and Maintenance Practices for Fire Protection of Confinement Ventilation Systems	10-33
10.8 Generic Firefighting Procedures.....	10-34
10.9 References.....	10-38
CHAPTER 11	
OCCUPATIONAL SAFETY AND HEALTH	11-1
11.1 Industrial Hygiene	11-1
11.2 Radiation Protection	11-8
11.3 Occupational Safety	11-16
11.4 References.....	11-18
APPENDIX A	
Care and Handling of HEPA Filters.....	A-1
APPENDIX B	
Receiving Inspection Direction and Checklist	B-1
APPENDIX C	
Determination of HEPA Filter Life.....	C-1